

that "the centre of activity in the division of the Protozoan cell, as in the Metazoa, resides in a special structure," which he terms the division centre, regarding it as "a specific substance different from the chromatin and from the cytoplasm." The origin of the division centre is doubtful, but "the widespread intranuclear condition favours the view that it originated there." It is not possible to deal here with the wealth of interesting facts which are marshalled in support of these conclusions, but it is strange that although Schaudinn's now well-known figure illustrating the life cycle of *Coccidium* is given twice over, no mention is made of his striking observations upon the origin of karyosome, and the rôle played by it in nuclear division, in the "endogenous" cycle of this type, nor is Schaudinn's memoir (1900) cited in the bibliography, which contains few references later than 1899.

In the chapters upon physiology, the facts and conclusions are arranged under the headings Intracellular Digestion, Respiration, Secretion and Excretion, Irritability and, finally, General Considerations.

In a work of this size there is, of course, much to criticise, and we may draw attention to a few errors or omissions, such as will always creep into the best regulated manuscripts. Spermatozoa are said, on p. 8, to have been withdrawn from the Protozoa during the present century! The Coccidian genus *Minchinia* is termed *Myxinia* on p. 20 (description of Fig. 6). In Fig. 31 B (p. 63) is depicted an associating couple or "syzygy" of polycystid gregarines, which look not unlike the common *Clepsydrina ovata* from the meal-worm; but the figure is labelled *Monocystis agilis*, Leuck. (*sic*). For Fig. 77, illustrating the development of a gregarine, Wasielewski is given as the authority, instead of the veteran investigator of the Sporozoa, Aimé Schneider. When the author states, on p. 146, that the Sporozoa are mononucleate (*sic*), "with the exception of the multinucleate Myxosporidiida," he should have added "and Sarcosporidiida," since a uninucleate Sarcosporidian has not yet been seen, leaving out of account the spores and reproductive bodies.

These are all trifles, but there is one feature of the book to which we wish to take exception; that is the author's practice of altering the form of well-known and familiar names of classes and orders. A similar tampering with names universally accepted and employed, in the vain effort to strive after uniformity—vain because in many cases it is very doubtful whether a given group of animals should be considered as a subclass, order or suborder—was a blemish upon the encyclopædic treatment of the Protozoa by Delage and Hérouard in the "Zoologie Concrète," where we find such monstrosities as "Ciliæ" and "Flagellia" for what everyone terms Ciliata and Flagellata. The desire of the author under review is to make all the subclasses end in "idia," the orders in "ida," and he adds this termination even to groups which in common usage already have it, e.g. "Myxosporidiida," "Hæmosporidiida." But the author has not the courage of his convictions to the same extent as Delage, for while writing "Flagellidia" he shrinks from "Ciliidia" or "Suctoriidia," retaining the usual appellations Ciliata and Suctoria. Endeavours to alter names in this way, however desirable, are absolutely useless

unless proposed by some international convention, sufficiently representative and authoritative for all to be agreed to follow its ruling. When attempted by individuals it only leads to confusion. Are we to speak of "Flagellia" with Delage, or of "Flagellidia" with Calkins? The majority of us will continue to say and to write "Flagellata" to the end of our days. While on the subject of terminology and nomenclature, it may be noted that the author actually names two new species; one in the description of Fig. 13, on p. 41, and another in that of Fig. 134, p. 251. The professed systematist and bibliographer must surely consider this a most reprehensible act in a work of this kind.

The work is provided with short special bibliographies at the end of each chapter, as well as with a general bibliography at the end of the book. The excellence of the figures has been pointed out, but it should be further noted that many of them are original, and of the latter we would draw special attention to the figure of division in *Gonium* (p. 129), to that illustrating a phase in the conjugation in *Arcella* (p. 218), and to the figure of mitosis in *Tetramitus chilomonas* [n. sp.] (p. 270). In conclusion, we heartily congratulate the editors of the Columbia University Biological Series on their latest volume, which keeps up the high standard of excellence of its predecessors.

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#### GREEK TOPOGRAPHY IN RELATION TO HISTORY.

*The Great Persian War and its Preliminaries.* By G. B. Grundy. Pp. xiii + 590. (London: John Murray, 1901.) Price 21s. net.

MR. GRUNDY has laid students of Greek history under an obligation by this work, but the obligation would have been greater if the bulk and price of the book had been less. The author seems, indeed, to have fallen between two publics. The scholar, who knows the literature of the subject, ancient and modern, will complain that he here labours the obvious and there ignores the essential, that his acquaintance with Greek history is superficial and his estimate of authorities uncritical, that the pages which present anything at once new and valuable are few out of many. The general reader will require more literary skill and lucid order in the story, and cannot be blamed if he prefers Herodotus in his native simplicity.

But it is probably neither as literature nor as history that Mr. Grundy would have us judge the book, but as a contribution to the topography of Greece and an essay in military criticism. Here he has done excellent service. The large-scale surveys of Thermopylæ and the field of Plataea are good bits of work, and will put the detailed discussion of those battles on a new plane. Mr. Grundy's topographical sketches are a welcome supplement to the maps, and show him to be no mean draughtsman. Most of them are better than the photographs with which they are interspersed, some (for example, the views of Marathon at p. 163, of Artemisium at p. 264, of the sound of Salamis at p. 392, of the panorama from Plataea at p. 502) are admirable pieces of line drawing.

To come to details, we could wish that the map of Thermopylæ covered more ground, even at some sacrifice

of scale. In the pass itself the mound and the Phocian wall are the only debatable points, and they might have been relegated (if necessary) to a little inset plan. (It is ridiculous, by the way, to treat the pretty story of the Spartans combing their hair as serious evidence for topography or "autopsy"—the other Greeks had to be invisible and the wall was a good excuse for hiding them, that is all!) But the real problems are concerned with the valley of the Asopus, the road into Doris, the site of Trachis and the path Anopæa, about the identification of which we have sometimes felt doubts. There must be a railway survey of the valley somewhere, which would give a base to work from, but Mr. Grundy is here less helpful than M. Hauvette, and does not even elucidate his own text—where, for example, is the Great Gable (p. 302)? Why is not Trachis the same as Heraclea, or its acropolis? What is the point of the polemic against Leake, who seems to have accomplished the not unprecedented feat of riding at six miles an hour? There is a useful note on p. 262 to show that "it seems to have been a recognised principle in later times that an effective defence of Oeta included the occupation of Heraklea as well as of Thermopylæ." But why not in earlier times too? Surely, if topography is worth anything as a test of the narrative of Herodotus, it points here to a serious omission.

Mr. Grundy has perhaps scarcely sufficiently guarded himself against the natural tendency to fix sites and positions on the authority of Herodotus and then triumphantly claim that the evidence of the topography confirms the story. We believe that he is right in his theory as to the "Island" at Platea, but where the identification of so many points is so uncertain we cannot avoid an uncomfortable notion that a turn of the spade may any day undermine his whole construction of the campaign, not to say the narrative of Herodotus itself.

On the other battles of the war Mr. Grundy has little that is new to contribute and scarcely anything of a geographical character. His theory of the campaign of Marathon is essentially Busolt's early view, recently revived by Mr. Munro, of the battle of Salamis a development of Prof. Goodwin's. He scarcely seems to appreciate the full significance of the position at Artemisium, which covers all the landing-places between Tempe and Attica. Aphetæ is a dubious point. It is hard to reconcile Mr. Grundy's situation with the remark of Herodotus, that the wreckage of the first sea-fight drifted *out* to Aphetæ, which is badly misrendered in the words "was thrust in upon the Persian fleet." Mr. Grundy is much put about to find a reason for the Greeks taking the offensive in 479. He concludes that they feared the establishment of a Persian frontier at Cithæron. Obviously the Persians would keep all they could conquer, but why should they stop at Cithæron? and is not the real difficulty the Greek *delay* in taking the offensive after the victory of Salamis had entirely changed the situation?

Where Mr. Grundy has seen with his own eyes he generally has something useful to say, but where he has not seen he cannot always be trusted. It is an absurd exaggeration to call the Taurus an "all but blank impassable wall"; and other references to it would certainly suggest that it runs north and south! The theory of the weak strategic situation of the Asiatic Greeks will not

hold where any communication by sea is so much better than any by land as in western Asia Minor. Was it either land or sea that divided, *e.g.*, Samos and Miletus? For downright geographical nonsense it would be hard to beat the description of Pteria as "a town whose position renders it the chief strategic point in the Halys region, commanding, as it does, the middle portion of the cleft-like valley through which the river flows" (p. 15). Mr. Grundy does not appear conscious of all the difficulties which beset Xerxes' march through Thrace as conceived by Herodotus. They do not harmonise well with his doctrine that the historian had himself traversed the road.

In the early chapters, the author makes great play with the idea of the "Ethnic frontier." As applied to the Persian attacks on Greece this is no novelty; but will it explain the conquest of Thrace? Are Phrygians and Bithynians still to be called Thracians in the days of Darius?

The book is sumptuously got up. It is a pity that so many misprints have been overlooked. Some of these are very unfortunate, *e.g.* banaustic (p. 94), St. Demetrian (three times), Elataea (four times), Oeroe with initial diphthong (always). Xerxes on p. 69 ought to be Darius. On the map of Marathon, Kynossema ought to be Kynosoura. On p. 350, Mr. Grundy has interchanged *east* and *west*—did he "alter his point of view"? On p. 378, a whole paragraph is based on a childish mistranslation of Herodotus.

In conclusion, we must heartily thank Mr. Grundy for publishing the many exquisite sketches by Edward Lear. They are as accurate as they are beautiful, and even had this book no solid merits of its own to recommend it, they would suffice to make it valuable.

#### GEOMETRY ON THE SPHERE.

*Spherical Trigonometry.* By the late I. Todhunter, M.A., F.R.S. Revised by J. G. Leathem, M.A., D.Sc. Pp. xii + 275. (London: Macmillan and Co., Ltd., 1901.) Price 7s. 6d.

THIS volume gives a systematic treatment of the subject of spherical trigonometry, based on the sound foundation of Todhunter rearranged and amplified. While the merit of the original work is sufficiently indicated by its vitality, the preface bearing the date 1859, it is natural that a text-book designed for the use of students forty years ago should to some extent fail to satisfy the requirements of the present day.

The subject falls naturally under two heads, (1) Formulæ connected with the Spherical Triangle and the Solution of Triangles, (2) Spherical Geometry. In both departments the reviser has used skill and judgment in grafting fresh shoots on the old stock, and has produced a homogeneous and well-balanced volume, double the size of the original and worthy to take its place among the best of our modern text-books. In trigonometry proper, Todhunter's treatment has been rendered very full and thorough. The theory is illustrated by well-selected numerical exercises, fully worked out and presented in the most concise form with due attention to labour-saving devices. Critical and ambiguous cases are carefully considered, discussed and illustrated diagrammatically, while